UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,190	09/24/2003	Boris Prokopenko	372465-01201	6386

37509 7590 04/01/2005

DECHERT LLP
P.O. BOX 10004
PALO ALTO, CA 94303

EXAMINER	
CASCHERA, ANTONIO A	

ART UNIT	PAPER NUMBER
2676	

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/671,190	PROKOPENKO ET AL.	
	Examiner	Art Unit	
	Antonio A Caschera	2676	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-36 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-36 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 24 September 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for priority under 35 U.S.C. 119(e).

Claim Objections

2. Claims 9 and 23 are objected to because of the following informalities:

a. These claims comprise of the phrase, "...an attributes of the pixel..." (see line 3 of each claim) which should be corrected to, "...an attribute of the pixel..."

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 15 and 29 recite the limitation "the viewer space coordinates" in line 7 of claims 1 and 15 and line 11 of claim 29. There is insufficient antecedent basis for this limitation in the claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 2, 4-7, 10-16, 18-21 and 24-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Strunk et al. (U.S. Patent 6,137,497) in view of Donham (U.S. Patent 6,646,648 B1).

In reference to claims 1, 15 and 29, Strunk et al. discloses a system and method for performing view clipping of graphics primitives, wherein the primitives are triangles defined by X, Y, Z and W coordinates of its vertices as well as R, G, B and alpha color or S, T, R and Q texture attributes (see abstract lines, 1-3, column 1, lines 35-45 and columns 8-9, lines 67-3). Strunk et al. discloses a graphics application program obtaining and sending vertex data defining an object, in object coordinate space, to a graphics system driver (see column 7, lines 22-24). Strunk et al. further discloses the object coordinates equivalent to the X, Y, Z and W coordinates described above (see #108 of Figure 1) and therefore the office interprets the object coordinates defined in an "object coordinate space" functionally equivalent to the world coordinate space of applicant's claims. Strunk et al. discloses the triangles to have associated texture and/or color data attributes (see columns 8-9, lines 67-3). Strunk et al. discloses the object, a "left front wheel" used as an example in Strunk et al., transformed from object space into window space via an intermediate conversion into eye space (see column 8, lines 35-52), the "eye space" and "window space" seen functionally equivalent to the view space and screen space of applicant's claims respectively. In the conversion from eye to window space, Strunk et al. discloses using

clipping plane coefficients multiplied by an inverse transpose of other projection data to obtain the window space coordinates (see column 8, lines 41-47). Strunk et al. also discloses a transform machine, comprised within the graphics system, determining whether vertices of a primitive require clipping by comparing vertex coordinates, in window space, to clip plane coordinates (see column 12, lines 24-40). Note, the office interprets that since vertices of triangles comprise R, G, B and alpha attributes, some number of pixels must be associated with the vertices and therefore these pixels are also inherently tested. Strunk et al. does not explicitly disclose computing barycentric coefficients and performing linear interpolation based on the coefficients to obtain an attribute of a pixel. Donham discloses a method and system for computing an LOD for individual pixels using interpolation of barycentric coordinates of the pixels (see column 2, lines 43-49 and 64-66). Donham discloses determining barycentric coordinates of a point, which lie within a triangle primitive, based upon the vertices of the triangle, to ultimately calculate the LOD for that point (see column 8, lines 4-8 and #420 of Figure 4). Donham also discloses interpolating constants at the vertices of the triangle in eye space and applying the barycentric coordinates of a point in question, to obtain an LOD value for that point (see column 6, lines 32-39 and columns 6-7, lines 59-22). Donham discloses the LOD value referring to a texture attribute for the point or pixel in question (see column 7, lines 1-5 and 10-22). Note, the office interprets the barycentric coordinates of Donham functionally equivalent to the barycentric coefficients of applicant's claim. Even further, the office equates the term "homogenous space" to the "screen space" of Donham as Donham further discloses the barycentric coordinates (a, b, c) all calculated based upon the same "screen space" coordinates of a triangle (A, B, C) (see equations, a =... b =... c= ... of Figure 3A). It would have been

obvious to one of ordinary skill in the art at the time the invention was made to implement the coordinate clipping and transforming techniques of Strunk et al. with the pixel attribute determining techniques of Donham in order to enhance a graphics computer system implementing texturing and viewpoint modeling by determining data not within the viewpoint, saving processing cycles by not requiring texture data of adjacent, not in view, pixels to be calculated (see column 2, lines 25-30 of Donham). Further, in reference to claim 29, Donham also discloses a computer system including a CPU, a front-end subsystem including numerous graphics accelerators and various memory units for storing information and instructions to perform the above attribute obtaining techniques (see column 5, lines 9-23 and #402 of Figure 4).

In reference to claims 2 and 16, Strunk et al. and Donham disclose all of the claim limitations as applied to claims 1 and 15 respectively above in addition, Donham et al. discloses defining vertices of a triangle in eye space as 1/WA, 1/WB and 1/WC and perspective correction coordinates, a*, b* and c* (see Figures 3A and 3B). Note, each A, B, C is interpreted as a vertex of a triangle as Figure 3A defines the area of the triangle as ½*k whereby k=|AC*BC| (see 3rd sentence of text in Figure 3A). Also note, the office interprets 1/WA and a* equivalent to (X1h, Y1h, Z1h, W1) of applicant's claims since 1/WA and a* represent values of one vertex in eye space. Further, the office interprets the LOD value for each vertex of a triangle equivalent to [piah] of applicant's claims wherein i=1, 2, 3, representing each vertex.

In reference to claims 4 and 18, Strunk et al. and Donham disclose all of the claim limitations as applied to claims 1 and 15 respectively above in addition, Strunk et al. discloses the graphics system including a rasterizer which receives pixels determined as not clipped

primitives and generates final color pixel data for displaying (see column 2, lines 13-14 and 19-29).

In reference to claims 5 and 19, Strunk et al. and Donham disclose all of the claim limitations as applied to claims 1 and 15 respectively above in addition, Stunk et al. discloses not passing pixel data to a plane equation machine if a primitive lies within a clipping volume computed from the clip volume determination test (described above) (see columns 12-13, lines 64-41).

In reference to claims 6 and 20, Strunk et al. and Donham disclose all of the claim limitations as applied to claims 5 and 19 respectively above. The office interprets that Strunk et al. inherently discloses blank pixel data in screen space defined by [x1s, y1s], [x2s,y2s]...[xns,yns] since, Strunk et al. discloses including a rasterizer which receives pixels determined as not clipped primitives, generates final color pixel data for displaying (see column 2, lines 13-14 and 19-29) and also because screen or window coordinate space is inherently defined using x and y coordinates.

In reference to claims 7 and 21, Strunk et al. and Donham disclose all of the claim limitations as applied to claims 4 and 18 respectively above. Stunk et al. discloses not passing pixel data to a plane equation machine if a primitive lies within a clipping volume computed from the clip volume determination test (described above) (see columns 12-13, lines 64-41). Strunk et al. discloses the graphics system including a rasterizer which receives pixels determined as not clipped primitives and generates final color pixel data for displaying (see column 2, lines 13-14 and 19-29).

In reference to claims 10 and 24, Strunk et al. and Donham disclose all of the claim limitations as applied to claims 1 and 15 respectively above. Since Strunk et al. the primitives are triangles defined by X, Y, Z and W coordinates of its vertices as well as R, G, B and alpha color or S, T, R and Q texture attributes (see abstract lines, 1-3, column 1, lines 35-45 and columns 8-9, lines 67-3) and that the transformation matrix (MPVD) includes values for X, Y, Z and W (see column 12, lines 18-20), the office interprets that the location and depth of each of the pixels (making up primitives) determined whether or not to be clipped are inherently represented in homogenous space.

In reference to claims 11-14, 25-28 and 36, Strunk et al. and Donham disclose all of the claim limitations as applied to claims 1 and 15 respectively above. Although Strunk et al. discloses associated point attributes to be color (R, G, B and alpha) or (S, T, R and Q) texture attributes (column 1, lines 35-45 and columns 8-9, lines 67-3) and Donham discloses the LOD value referring to a texture attribute for the point or pixel in question (see column 7, lines 1-5 and 10-22), neither Strunk et al. nor Donham explicitly disclose the attribute value specifically being depth or shading values (as claimed in claims 11/25, 14/28 and 36). However, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to perform the coordinate clipping and transforming techniques of Strunk et al. with the pixel attribute determining techniques of Donham upon numerous attributes including shading and/or depth attributes. Applicant has not disclosed that performing the attribute obtaining techniques specifically towards shading and depth values provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with the color and texture attribute

obtaining techniques because the exact attribute onto which such attribute obtaining techniques are applied is a matter of design choice as preferred by the designer and/or to which best suits the application at hand. Further, the mere fact that the applicant has claimed multiple attributes further indicates that the exact attribute obtained provides no immediate criticality to the application at hand. Therefore, it would have been obvious to one of ordinary skill in this art to modify Strunk et al. and Donham to obtain the invention as specified in claims 11/25, 14/28 and 36 specifically.

In reference to claim 30, Strunk et al. and Donham disclose all of the claim limitations as applied to claim 29 above. Strunk et al. discloses a front-end subsystem including numerous graphics accelerators (see #402, 414a-p of Figure 4) which the office interprets functionally equivalent to applicant's ALU's and reciprocal unit as the accelerators are capable of operating upon fixed and/or floating point data (referring to applicant's specification and the reciprocal unit) (see column 10, lines 7-13).

In reference to claim 31, Strunk et al. and Donham disclose all of the claim limitations as applied to claim 29 above. Neither Strunk et al. nor Donham explicitly disclose the use of an SIMD scalar unit however, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to implement the best combination of hardware and software in order to optimize the invention at hand. Applicant has not disclosed that specifically using an SIMD scalar unit provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with the driver and graphics accelerators of Strunk et al. because the exact implementation of hardware is seen as a matter of design choice as preferred

by the designer and to which best suits the application at hand. Therefore, it would have been obvious to one of ordinary skill in this art to modify Strunk et al. and Donham to obtain the invention as specified in claim 31.

In reference to claim 32, Strunk et al. and Donham disclose all of the claim limitations as applied to claim 29 above. Neither Strunk et al. nor Donham explicitly disclose the use of a bypass register however, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to implement the best combination of hardware and software in order to optimize the invention at hand. Applicant has not disclosed that specifically using a bypass register provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with the driver, graphics accelerators and frame buffer system of Strunk et al. because the exact implementation of hardware is seen as a matter of design choice as preferred by the designer and to which best suits the application at hand. Therefore, it would have been obvious to one of ordinary skill in this art to modify Strunk et al. and Donham to obtain the invention as specified in claim 32.

In reference to claim 33, Strunk et al. and Donham disclose all of the claim limitations as applied to claim 29 above. Stunk et al. discloses not passing pixel data to a plane equation machine if a primitive lies within a clipping volume computed from the clip volume determination test (described above) (see columns 12-13, lines 64-41). The office interprets that Strunk et al. inherently discloses blank pixel data in screen space defined by [x1s, y1s], [x2s,y2s]...[xns,yns] since, Strunk et al. discloses including a rasterizer which receives pixels determined as not clipped primitives, generates final color pixel data for displaying (see column

2, lines 13-14 and 19-29) and also because screen or window coordinate space is inherently defined using x and y coordinates. The office interprets the rasterizer functionally equivalent to the triangle rasterizer of applicant's claim.

In reference to claim 34, Strunk et al. and Donham disclose all of the claim limitations as applied to claim 29 above in addition, Strunk et al. discloses the graphics system to comprise of a driver unit which receives primitive data along with transformation matrix data and performs coordinate space transformation (see column 9, lines 31-45 and #404 of Figure 4) which the office interprets as functionally equivalent to the vertex geometry processing unit of applicant's claim.

In reference to claim 35, Strunk et al. and Donham disclose all of the claim limitations as applied to claim 29 above in addition, Strunk et al. discloses the plane equation machine operating on floating point plane data (see column 13, lines 41-45) which the office interprets to inherently disclose operating in at least one of the floating point modes as recited in claim 35.

Allowable Subject Matter

5. Claims 3, 8, 9, 17, 22 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In reference to claims 3 and 17, the prior art of record (Strunk et al. (U.S. Patent 6,137,497) and Donham (U.S. Patent 6,646,648 B1)) does not explicitly disclose the definition of the homogenous coefficients of vertices of a triangle as, a=yjh*wk-ykh*wj; b=xjh*wk-xkh*wj

and c=xjh*ykh-xkh*yjh, in combination with the further limitations of claim 3 and 17 respectively.

In reference to claims 8, 9, 22 and 23, claims 8, 9, 22 and 23 depend upon objected to claims 3 and 17 respectively above and are therefore also objected to.

References Cited

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

a. Shirman et al. (U.S. Patent 5,550,960)

- Shirman et al. discloses a system and process enabling the dynamic mapping of texture to a variety of primitives.

b. Mang et al. (U.S. Patent 6,686,924 B1)

- Mang et al. discloses a method and apparatus for parallel processing of geometric aspects of video graphics.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Antonio Caschera whose telephone number is (571) 272-7781. The examiner can normally be reached Monday-Thursday and alternate Fridays between 7:30 AM and 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella, can be reached at (571) 272-7778.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

aac

3/17/05

Kee M. Tung
Primary Examiner